With compliments of

Wilbur S. Tupper.

Vice President

An Address

DELIVERED BY

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BEFORE THE

COMMERCIAL CLASSES

OF THE

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SOME PRIMARY PRINCIPLES
OF
LIFE INSURANCE

LADIES AND GENTLEMEN:—Before beginning the talk which I have in view, let me thank you first of all for the cordial reception which you have given me. It was not so many years ago, as it seems to me, and still it was twenty in reality, that I myself climbed the steps of the university to begin my course; and after passing through similar courses to those which some of you are now taking, I think I appreciate, more than I otherwise would, this reception and this opportunity of speaking to college students.

From the earliest times, perhaps no one fact has impressed itself upon the minds of historians, poets and philosophers, as much as the uncertainty of human life. It has been the subject of song and story. Nothing in the world is so uncertain and indefinite as the after duration of any individual's life. It may come through disease, it may come through accident; it may come in one of varying forms, and it often comes unannounced and suddenly.

While it is true that nothing is so uncer-

tain as the duration of individual life, it is also true that nothing is so absolutely certain as the duration of community life. What do I mean by community life? I mean that, if we take a group of individuals under the same conditions and ages, leading the same sort of life, we shall find that the after duration or average length of life will be relatively the same. Not only is this true of different localities, but it is almost absolutely true of different times. Thus the duration of human life today is about the same as it was in the early times when the first mortality tables were formed. And in the main any differences that have been observed or recorded in this respect are due more to increased data obtained and greater facilities for observation, perhaps, than to any actual differences which exist.

Life insurance enables the individual whose life is uncertain and likely to be snuffed out at any moment to partake of the average longevity of the race. In other words, let us assume that there is one student here of the age of 30. He has an expectation of life of about 35 years. This assumes that he is the average in reality as well as in theory. Now, by means of life insurance, that life may be absolutely insured so far as the productiveness of it is concerned. It may share in the average productiveness of life—an equivalent, in a monetary way, for living the average duration of life.

Of the various mortality tables which have been prepared, I shall call your attention to two in common use in this country, and shall not go into details to any great extent in speaking of these. The first is the "Combined Experience" table of mortality, often

called the "Actuaries'." This was derived mainly from the combined mortality experience of some seventeen English companies; and the results graduated and carefully tabulated were thereafter used as a basis of life insurance calculation and practice. The other in use in this country is the so-called "American Experience" table. This was chiefly derived from the mortality statistics of one of the large American companies. But the Combined or Actuaries' table was carefully used in grading this and was the general basis for the table. All of the life insurance companies in the United States, I believe, use one of these tables.

In your general studies upon this subject it will be of interest to you to look up the particular statutes of your own state. Remember that the mortality table and the rate of interest are matters which vary and which may be changed in different states. I believe that the standard of the State of Michigan at the present time is the American Experience with 4 per cent. interest.

Let us say further that no one pretends that either of these tables is technically correct; perhaps neither one is, nor is it necessary that it should be. They are both approximately correct; and close enough to actual experience to enable any life insurance company to do business safely.

An understanding of the elementary principles of the life insurance business—the calculation of premiums, etc., may be had without recourse to mathematics beyond that familiar to the ordinary high school student. We have to deal merely with the force of mortality and with interest calculations. I will show you in brief, in a simple way, how

to compute a premium to insure a life—let us say of the age of 30. Let us calculate the premium that will insure $1,000 at the age of 30 for one year, assuming the American experience table and 4 per cent. interest.

In the first place we have to consider not merely the force of mortality but also interest. The calculation of premiums in life insurance is upon the assumption that the premium is paid at the beginning of the year, and the benefit at the end of the year in which the life fails. The average death would, of course, occur in the middle of the year. That would, according to exact calculations, give the company six months to pay the average claim. Some time must be given to examine proofs of death and make any investigation necessary. As a matter of fact, the practice is to pay death claims within 30 to 90 days after receipt of proofs; and some companies pay claims immediately upon receipt of satisfactory proofs of death.

Now the first proposition is this: What is the present value of a dollar, at the rate assumed, due at the end of a year? It may be represented by the fraction $\frac{100}{104}$ or .9615, the amount that will at the same rate of interest produce $1.00 in two years is $\frac{100}{104} \times \frac{100}{104}$, or .9245. Similarly for other periods.

We will start at the age of ten, taking 100,000 people, and note the decrement by death at the end of each year. Now how many will be alive at the age of 30? The table says 85,441. Now how many of these will die between the age of 30 and 31, or during the year for which we are to insure this one life at the age 30? Can any one in the class give the answer? As a matter of fact the table says 720. Now the fraction $\frac{720}{85441}$

represents the probability or the chance that a life of the age of 30 will fail during that year. Now if we multiply the probability of death during that year by the present value of a dollar due at the end of that year, we shall have a result something as follows—.0081. In other words this .0081 will insure one dollar at the age of 30, to be paid in case the life fails during that year, the amount to be paid at the end of the year; and $8.10 will insure $1,000 at the beginning of the year at age 30, the amount to be paid in case of death at the end of the year. The figures given on the board insure the life for one year only. The cost of insurance, effected at age 30, to insure the life for age 31, is found by multiplying the present value of one dollar due at the end of two years by a fraction whose numerator is the number dying between ages 31 and 32, and whose demoninator is the number living at age 30. This amount paid at age 30 suffices for the insurance for the year 31.

In a similar way we may compute the cost of insuring at age 30, $1,000 for the ages 32, 33, 34, etc., to the table limit. I should have explained earlier that we assume a limit to human life, at age 100 in case of the Actuaries' table and at age 96 in case of the American table. We must arbitrarily cut the table off at some point.

Having computed the cost of insuring a life at ages 30, 31, 32, etc., to the table limit, let us add these costs together. We shall then have a single net premium that will insure $1,000 at age 30, for the whole of life. You will notice I have said a single premium, and I have also called it a net premium.

A single premium means that the whole cost is paid in one sum in advance. Now that

is not the way in which life insurance protection is ordinarily obtained. Men do not effect purchases of life insurance as they buy a suit of clothes. What is the process? Instead of paying a single premium in advance, the applicant effects that which in reality is an exchange or barter. It is inconvenient, sometimes impossible, for the applicant to pay down the full price of protection. The life insurance company gives him a policy and he gives to the life insurance company, not the price of the insurance, but an annuity on his own life. Thus an exchange is made, and not a sale in the ordinary sense.

Now to convert the single net premium paid in advance into an annual net premium, we may simply extend or change the single payment at the beginning of the term into an equivalent annuity; into annual payments running through life or for twenty years or ten years as the case may be. Then we have the premium in the form that it is usually applied.

Let us assume that instead of selling a policy of life insurance, we want to sell a pure endowment of $1,000. I mean by this that $1,000 will be paid, say to a man taking out the endowment at age 50, if he shall be alive 20 years after. Nothing is to be paid in case of his death during the term. Now I will use round numbers instead of using the technical figures of the table. We may gain in clearness what we lose in exactness. The principle is the important thing. Roughly, at age 50 about one-half will be alive at the end of 20 years. We are now selling a pure endowment to a man at age 50, engaging to pay him $1,000 if he is alive 20 years from today. We are also selling 99 other men, age 50,

pure endowments, each a like amount on like terms. Now if all these one hundred should live, we must manifestly have on hand at the end of the time $100,000. But in view of the fact that the table shows that only half of them will be alive, we shall need at the end of the term only $50,000. So if there were no such thing as interest in this calculation, we must observe the decrement by death during that period, and have on hand at the end of the period enough to pay each one alive at the end of the time.

But there is the interest calculation. Let us assume the rate at 3½%. Now, how much of each dollar must we have on hand so that it will, by compound interest, in 20 years amount to a full dollar? We will say again, roughly, about 50 cents. If there were no interest we should need $500.00 to be paid in advance from each man. In view of the fact that the present value of a dollar due at the end of twenty years is practically 50 cents, we must really have only $250.00 from each man, as the price of a pure endowment at age 50 to be paid 20 years after, if the purchaser is then alive. This is the single premium, paid in advance, to be changed into an annual premium as before explained.

Now that is a pure endowment, the purchaser getting nothing in case of death during the term and receiving the endowment only if he lives through the period fixed in the policy. Now, a life insurance endowment means $1,000.00 in case of death during the term, and $1,000.00 in case of survival to the end of the term. How do we get that?

Using the illustration already on the board, we will now find the cost of insurance, at any age, not for one year only, but successively for

twenty years. In other words, the premium that will be sufficient on a basis of $1,000.00 for all the deaths that occur during 20 years, according to the table rate. We will add to that premium the premium for pure endowment, at same age, as just explained, necessary to pay a like amount to those that survive to the end of the term. By putting the two together we provide for both those that live to the end of the term, and those that die prior thereto; and that is the method by which a regular life insurance endowment rate is calculated.

I have used the term net premium in these illustrations. I mean by that the exact insurance cost, assuming the mortality and interest rate to be exactly realized. We have as yet made no provision whatever for expenses of administration, emergencies, dividends, so-called, or anything of the kind. Now the "gross," or "office" premium is formed by adding a certain amount to the net premium, which is to cover expenses of management, etc. Now, in truth, this addition or "loading," as it is called, varies with the custom of the company, the style of the policy, and the general conditions of the business.

Insurance generally in this country is sold on what is known as the "participating" plan, with "dividends" or "profits." Now, right here let me assure you that there is no such thing, according to the usual meaning of the term, as a dividend to the insured in life insurance. A dividend means profit. There is no profit in life insurance. Life insurance entails an absolute cost as does everything of value. This cost may be disguised or concealed in various ways. But it is there just the same. What are the so-

called dividends or profits of life insurance companies, as respects the policy-holder? They are really an abatement of the cost, the proper return of a proper overcharge, considered necessary in the premises. In other words, we do not know in advance exactly what the mortality rate will be; we assume the table rate. Now, our experience may, and ought to, through medical selection, bring the death rate below the table rate. Then there will be a saving in mortality, will there not? And that forms a part of the so-called dividend.

Again companies assume a conservative rate of interest, say 3 or 3½%. Now, if they make more money on their investments there will be excess interest earnings. And that excess will contribute to the so-called dividend. This element may be considered a real earning or profit.

Again there may be savings in the administration of the business: this may also be added to the dividend account. There may be other possible sources of dividends, so-called, but those outlined are the principal ones.

Why should life insurance be effected in this way? If you should go to a tailor and ask the price of making a suit, he would not say, "We will buy the cloth, figure out the cost of making, and other necessary expenses, and add them together; you pay so much down, and if there is anything left, after a fair profit, you will get it back." We should consider such a tailor a fit subject for the insane asylum. With most commodities — nearly everything—the exact cost of production can be ascertained and is clearly known before the sale is made. But the exact condition which shall exist during the running of a life insurance policy cannot be known in advance. Hence we may properly

assume a rate which may be greater than is needed with proper return of what shall be saved out of the appropriation made.

There is one company only in the United States that sells all its contracts on the non-participating basis, without any return of so-called profits or surplus. And another very great company in this country does nearly all of its business on this non-participating plan.

Some one asks me here what is the amount or percentage added to the net premium to make the gross or office premium. This is a hard question to answer, and one depending upon the company and kind of policy contract considered. Generally we may say that the non-participating policy is loaded from the very smallest per cent. up to about 15 per cent. For the participating rate the loading on various policies will run from 15% up to say 40%, according to the kind and style of policy. Much difference exists among companies not only as to the amount of loading but method of applying it.

The two mortality tables referred to are sufficient to insure, as a rule, all of the adults in any city or state of this country without medical examination. Bear this in mind; it is an important principle and is often overlooked. Now you know that in order to get a policy you have to do something more than simply make application; you must be examined by the company's physician; a most rigorous examination of your life is made—at some expense to the company, too. Why does the company do that, if these tables are sufficient to insure all adults living in Michigan without medical examination?

To explain, let us assume now that companies have no medical examinations at all;

who would apply for insurance? Not the men eligible for your foot ball team; not those who have every reason to expect to live long. No; those applying would be such as know or feel for some reason that life with them is to be short. If companies had no medical examinations, only the sick, only those certain soon to die, or fearing that they would soon die, would apply for insurance, and we would therefore not have anything like the average mortality rate as a result.

So in the first place companies examine risks to guard against adverse selection. That which an individual chooses in respect to life insurance as favorable to himself, as between two courses of action or two options, —if it be favorable to him, conversely it must be adverse to the company. Therefore companies examine men in order to guard first, against this adverse selection, in order that they may not get all the bad risks in the community, while the others are entirely indifferent whether they insure their lives or not. Furthermore, examinations are made to bring about affirmatively as favorable a selection as possible.

Again, if we could secure average lives *en bloc* without the cost of medical examination, the results would be fully as favorable, from a practical financial standpoint, as they are by selecting risks, with the cost of medical examination. To secure average lives *en bloc*, is impracticable, therefore medical examination is not only desirable but absolutely necessary. I can illustrate adverse selection in another way. We have various kinds of policies; cheap term policies, ordinary life policies and endowment policies. Now in the practical operation of the company, in spite of medical

examination, we find a higher death-rate among those who apply for cheap term policies. Why? Simply because those who are applying for low-priced term policies are doing it because they feel that there is some reason for thinking that they will die before the end of the term. On the other hand, those who are taking out high-priced endowment policies are better risks than the ordinary life insurers, simply because they feel pretty certain that they will live out the term of the policy and receive the endowment. Otherwise they would not have applied for the endowments.

In connection with this topic, let me call your attention to a very important fact in regard to mortality among women. The British government has for many years sold annuities on the lives of men and women. Many years ago a number of Dutch investors made large investments by buying annuities on the lives of healthy young women. Long before the death of all of these, they had demonstrated that women live longer than men; that they are poorer risks for the grantor of the annuity; hence the Dutch investors made a very large profit. Now this was about the beginning of an investigation in regard to mortality as between the sexes. And the finding of the Dutch investors has been repeatedly confirmed since; that, in adult life at least, women live longer than men. What was the result of this? Shortly afterwards a couple of companies organized in London for the special purpose of insuring the lives of women. These two companies took women very readily and freely. Both these companies became bankrupt, because the mortality among women was so great! The

Dutch investors found that the women were better as annuitants and lived longer; and the two life insurance companies failed, because of the greater death-rate among women. Now that is one of the greatest apparent paradoxes that could possibly be observed. And from that day down to this some companies, and some American companies, too, have charged women more for annuities, because they are supposed to live longer, and more for life insurance because they are supposed not to live so long. What resolutions do you think a woman's rights organization would pass relative to this?

What is still more remarkable is the fact that both these courses were entirely logical. Why? On account of adverse selection again. They did not get a fair selection from these risks on women. Women were, and still are, occasional insurers, not average insurers. They are not hunted out by agents and fairly dragged by the neck into insuring their lives, as men are. And in consequence such women as insure their lives are the occasional ones who seek insurance, or are willing listeners, because they know or feel that there is some reason why their lives should be protected. And therefore a higher death rate among female risks, as a whole, may be expected. Only when female risks are sought as vigorously as men are, can you get a mortality rate as favorable as on the lives of men. Another contributary cause to a higher death rate among female risks is woman's traditional privilege of concealing anything about her past history or present condition. Fair examinations are not so easily obtained.

Adverse selection will be felt when a policyholder chooses an option. Assume that a man

insures at age 30, gets a 20-payment life policy of $1,000 and lives to be 50. Let us say that he has a reserve, or cash credit, of $500. Now at 50 the policy is fully paid up for life; he may take that and have no more to pay on it, or he may have his cash reserve, or credit, of $500. He cannot have both. Now the death rate jumps up at this point and then slowly goes down again. Why? Because all those who feel that death is near are going to take the policy and let it run; while all those who are healthy and feel they are going to live, will take the $500. Thus through adverse selection the poorer risks, as a rule, remain with the company.

I see my time is going rapidly and I shall not have time to more than touch upon other interesting branches of the subject. Just a word as to investments. In the first place, you must bear this in mind: Make all of your investigations in life insurance investments start with the statutes of the State. The life insurance corporation is a creature of the statute, and of course derives all its powers and privileges from the laws of the State. It must therefore make all its investments along certain lines which the statutes permit.

From State supervision of investments there are good results and bad results. The good results are that a general rule of this kind will keep some companies, possibly, from straying beyond bounds, and thus compel them to invest the people's money more safely. The bad results are that, as the rules must be general in their application, they restrict a company from some profitable investments which otherwise probably might be made. Some statutory provisions in regard to investments are "survivals," not adapted in all respects to

the changed conditions of the present time.

Among investments generally permitted you will find United States bonds, the bonds of the state and the bonds of the municipal corporations of the state, and sometimes those of other states and municipalities. Likewise bonds of certain corporations under conditions specified in the statute. You will always find real estate mortgages, under certain conditions, generally that they must be first mortgages on improved property, and for not exceeding one-half the value of the property. See the statutes of Michigan for the requirements in your own state.

Now right here I want to call your attention to what seems to me a singular fallacy or mistaken notion in regard to real estate mortgages as life insurance investments. The common assumption is that no investment can be better for a life insurance company than mortgages on real estate. You recall what I said about adverse selection in the matter of risks. Now let us see how adverse selection operates here.

Let me represent this graphically on the blackboard as follows: Let the space between these two lines, say about a foot apart across the board, represent the value of mortgaged real estate. Draw a line halfway between these two lines, and let the space between this and the lower line represent the mortgage or the money loaned. Now these real estate mortgages are in various parts of the country. In Detroit, in Minneapolis, in Omaha, in Denver, in Los Angeles. In the course of time there will come depressions in real estate in some places. There will be a wave of depression running along, striking the middle lines from above in some places. Now what is the result?

Wherever the actual value comes more than half way down, touches or goes below this middle line, the real estate becomes worth less than the mortgage, and the mortgagor is going to let it go, and the property goes to the company. It will be to the interest of the mortgagor to let it go. Hence the companies will gradually accumulate, never the best, but always the least desirable pieces of property.

Again, when the company gets this mortgaged real estate, it is usually, or should be, improved property; and this is a constant source of annoyance and expense. Wherever depreciation in values—as upon the collapse of a boom—has left property worth less than the mortgage, the company acquiring it must run a regular real estate and rental business in addition to the many cares of insurance business proper. The foreclosed property requires improvements, repairs, and care generally. I believe I am safe in the assertion that as between good bonds and real estate mortgages, generally, there should be a difference of one-half of 1% to make up for the adverse selection which is sure to go on, as the company will inevitably acquire the most undesirable pieces of real estate.

A company should be as free as possible to energize along lines of its own appropriate business,—which is the insuring of lives.

Some companies, especially in earlier years, have been conspicuously successful with real estate investments. In general the worst feature today of many an excellent company's statement is the item of depreciated and unproductive real estate, acquired under foreclosure. One company in particular, scrupulously rigorous in what it deems correct insurance methods, has, through this

process of adverse selection, been compelled to own enough real estate in the Mississippi Valley to abundantly confirm this principle. And there are others.

In respect to investments there are some differences to be observed between the older and larger companies and the younger and smaller ones. A very large company will have the advantage which goes with a large volume of money. It can take advantage of financial opportunities, and can measurably control, or at least affect, the market. The cumulative force of capital is in its favor. On the other hand, the young company will not have among its assets foreclosed mortgages, unproductive real estate or depreciated bonds. Furthermore, the small company is able to invest its hundred thousands or its one million of income obviously more profitably than will be possible with an income of sixty millions, and generally can better personally investigate securities. This whole subject of life insurance investments is a very interesting one, and one which I commend to you for further investigation.

In the few minutes that remain I want to call your attention to a broader and deeper meaning of life insurance than is usually implied by that term.

Life insurance rests on the same basis as fire insurance. While life is precious, viewed in the light of sentiment, it is the financial value of a life which is really insured. Human life is insured for the same reason as a building, and for that reason only. Now let me call your attention to a singular anomaly: Suppose that a building or furniture has been insured, and is by fire partly destroyed. That partial loss would be paid of course, be-

cause the insurance company insures for whatever loss may occur to the property by fire, within the amount of the policy and the value of the property. Now, remembering that it is the productive energy of human life that is insured, what shall we say of a partial loss of life through accident or disease?

Insurance against accident and insurance against disease are well recognized branches of the business; but they have been heretofore looked upon as something distinct and apart from life insurance. *As a matter of fact, they are both life insurance in the full sense of the term, as much as the insurance which protects your building against a partial loss is fire insurance, equally with that which protects it from a total loss.*

Life insurance policies are now being devised which shall protect life fully and completely and pay the partial loss as well as the total loss of life. And in one contract, also. Those who need insurance most to protect their families in case of death, are generally those who can least afford the loss of the productive energy of life, when that loss is brought about by accident or disease. Insurance that protects life against a partial loss appeals strongly to the human mind and the human heart; because man is essentially selfish. Justly, on high moral grounds, insurance against the partial loss should appeal with great force, to the insurer who is a producer or wage earner. If he does not protect himself and his own earning capacity, how can he hope to be able to pay a premium that shall protect his wife and children, should he for any reason lose that earning capacity?

I call this to your attention as one of the latest, and, to my mind, one of the greatest

developments of life insurance; a contract which protects the family of the insurer in case of death; which protects him in case his life suffers an infraction by sickness or by accident. This is life insurance in its most complete and perfect form.

Even as mortality tables have been prepared, indicating what the death rate is, as a basis for proper rates insuring against death, so do we have tables that indicate the cost of insurance against accident and insurance against disease, which are partial or temporary losses of life.

Now, in conclusion, as the hour closes, let me say that I have been able merely to call your attention to points in outline without stopping to develop them. I trust that this talk will add to your interest and lead you to study further this great subject which is such a mighty force today in the commercial and industrial world.

Ladies and gentlemen, I thank you very much for your interest and your attention.